

REMARKS

Claims 1-16 and 23-28 remain in the application. No claim amendments are made in this paper. Claims 1 and 23 are the independent claims herein. Reconsideration and further examination are respectfully requested, in view of the following arguments.

Claim Rejections – 35 USC § 103

Claims 1-9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messina (U.S. Patent No. 5,239,200) in view of Chu (U.S. Patent No. 6,489,551).

Claim 1 is directed to an “apparatus” which includes “an integrated circuit (IC) die having a front surface on which an integrated circuit is formed and a rear surface that is opposite to the front surface”. The apparatus of claim 1 further includes “a member to define at least one microchannel at the rear surface of the IC die, the microchannel to allow a coolant to flow therethrough”. In addition, the apparatus of claim 1 includes “at least one thin film thermoelectric cooling (TFTEC) device in the at least one microchannel”.

In formulating the rejection of claim 1, the Examiner relied on an asserted combination of the Messina and Chu references. However, applicant respectfully traverses the rejection of claim 1 and will demonstrate in remarks to follow that the references relied upon by the Examiner, taken alone or in combination, fail to disclose the claimed feature of a thin film thermoelectric cooling device that is located in a microchannel defined at a rear surface of an IC die.

To provide an overview of the most relevant teachings of the two references, Messina discloses a cooling plate 20 which operates to conduct heat away from ICs 16. The cooling plate 20 has formed therein channels 22, which the Examiner considers to be microchannels. A coolant flows through the channels 22.

The Examiner cites Chu as allegedly disclosing “a thin film TEC device”. The Examiner cites element 20 in Chu as being such a device. In this respect, applicant respectfully urges that the Examiner is in error. The element 20 in Chu is indeed a thermoelectric cooling (TEC)

device, but it is not a thin film TEC device. Thus the Chu reference does not support the Examiner's reliance thereupon.

It is believed that this error alone is sufficient reason for the pending rejection of claim 1 to be reconsidered and withdrawn. Nevertheless, there are other significant flaws in the pending rejection of claim 1.

In explaining his rationale for the rejection, the Examiner noted that Messina fails to disclose at least one thin film thermoelectric cooling device in at least one microchannel. In this respect, applicant agrees with the Examiner.

Thereafter, the Examiner (erroneously) describes the disclosure of the Chu reference and then goes on to state the following conclusion of obviousness:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a TFTEC as taught by Chu employed in the apparatus of Messina in order to provide active temperature control and reduce a leakage power consumption.

Aside from the error, noted above, in attributing disclosure of a thin film TEC device to Chu, this conclusion of obviousness is further flawed in that it fails to state a prima facie case of obviousness. Applicant finds it particularly significant that the above-quoted conclusion of obviousness fails to take into consideration a key claim limitation, namely that the thermoelectric device of claim 1 is located in a microchannel. Applicant believes that if the Examiner had properly taken this claim limitation into consideration, it would not have been possible for the Examiner to conclude that the apparatus of claim 1 is rendered obvious by the combination of the Messina and Chu references. To underscore the insufficiency of the Examiner's stated rationale for his rejection, applicant wishes to point out that the Examiner does not even state that the combination of Messina and Chu would make it obvious to place a TFTEC in a microchannel. Rather, the Examiner merely states that it would have been obvious "to have a TFTEC ... employed in the apparatus of Messina". Moreover, this statement is not only legally insufficient but it is also not supported by the references, at least because no reference relied upon by the Examiner even discusses TFTECs.

Still further, even if the Examiner wished to recite a legally sufficient conclusion of obviousness, he could not properly do so, given the lack of support in the references he relies upon. Neither of the references, nor the combination thereof, provides any apparent reason for placement of a thermoelectric cooling device in a microchannel in which a coolant flows for an IC die. Furthermore, there is no basis in the references for believing that it would even be possible to place TEC devices like those shown in Chu in a microchannel.

To summarize applicant's contentions with respect to claim 1, the Chu reference does not disclose a thin film TEC device, and there is nothing in either reference, or elsewhere in the prior art, that would lead one of ordinary skill to dispose a thin film TEC in the coolant channels disclosed in the Messina reference. It is therefore respectfully requested that the rejection of claim 1 should be reconsidered and withdrawn.

In view of the above, it is not believed that the other rejections now pending present any issues that require discussion at this time. Applicant will simply note that the above discussion of the rejection of claim 1 is equally applicable to the pending rejection of claim 23, which is the other pending independent claim.

C O N C L U S I O N

Accordingly, Applicant respectfully requests allowance of the pending claims. If any issues remain, or if the Examiner has any further suggestions for expediting allowance of the present application, the Examiner is kindly invited to contact the undersigned via telephone at (203) 972-3460.

Respectfully submitted,

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Date

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